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(54) Corkscrew

(57) An electrically operated corkscrew comprises a body containing an electric motor drive 40 and a screw 18 for removing corks, the drive being arranged in one sense of rotation to advance the screw to a point where it contacts the cork and then to rotate the screw in a sense such that the screw bores into the cork, and being arranged when rotated in the opposite sense thereafter, to cause retraction of the screw relative the body for withdrawing the cork from the bottle followed by rotation of the screw such that the cork becomes unscrewed from the screw. The motor drives the screw via a reduction gearbox 48, 50 and a pinion 30. The pinion is mounted on a threaded rod 20 to which the screw 18 is attached. The motor is controlled by a three-position switch 70. The bottle is contacted by a transparent spring-loaded sleeve 80.

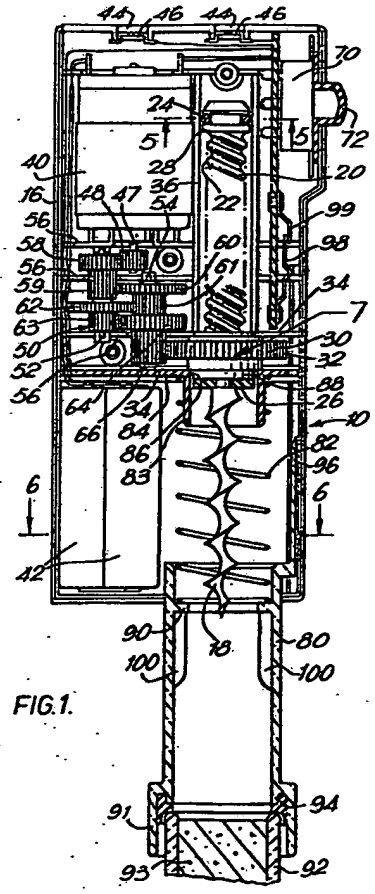

FIG.1.

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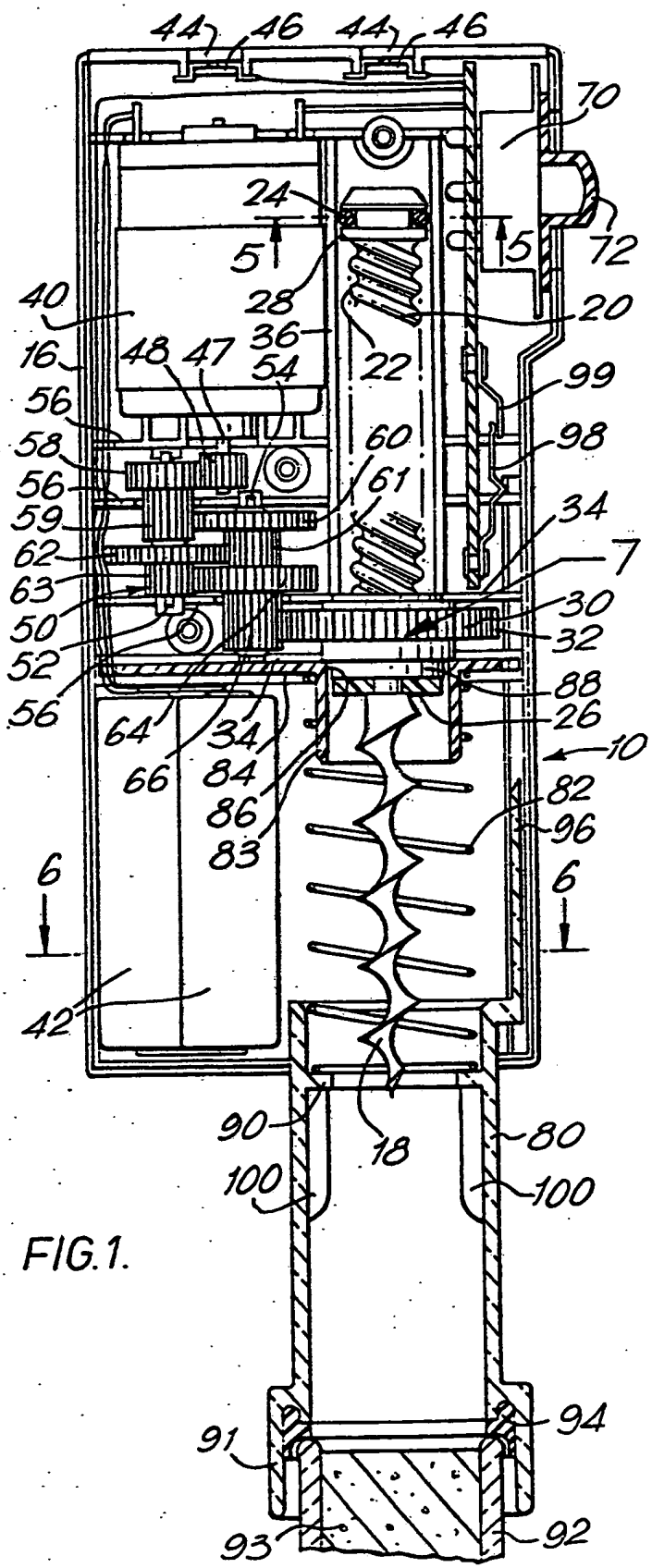

FIG.1.

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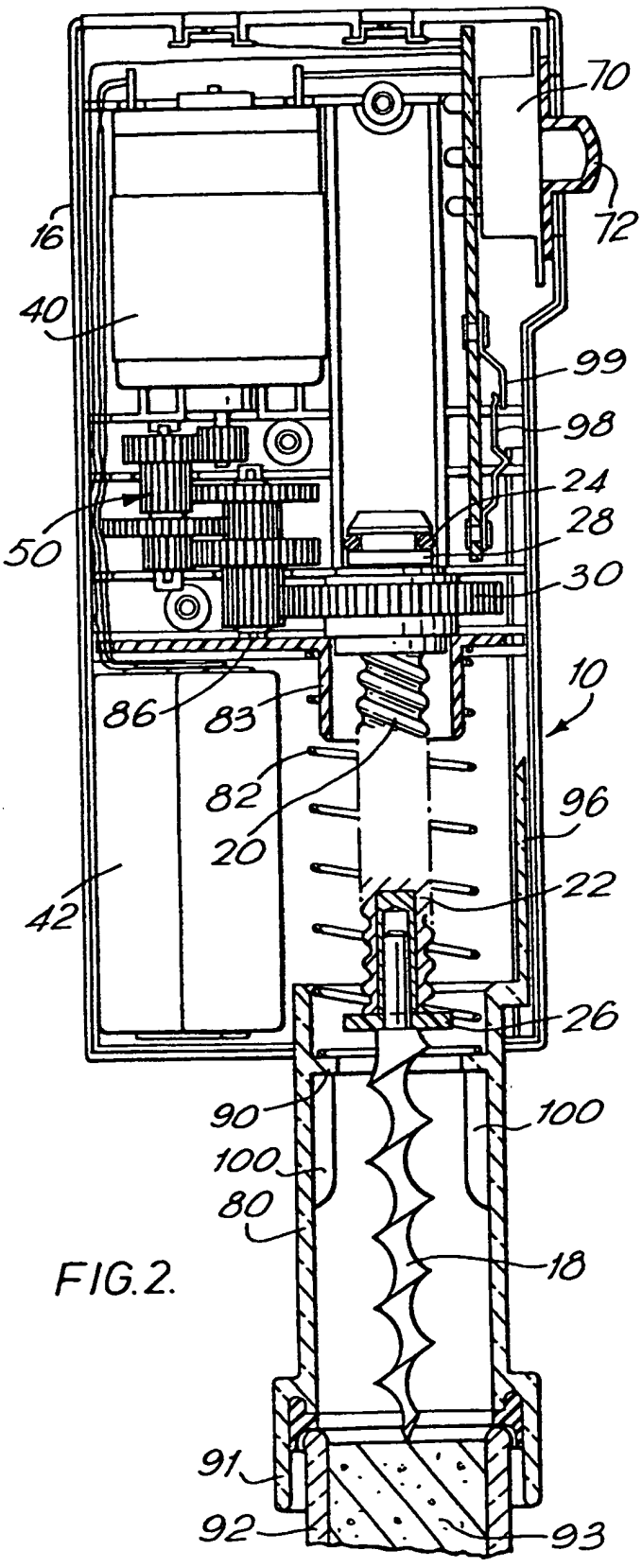

FIG.2.

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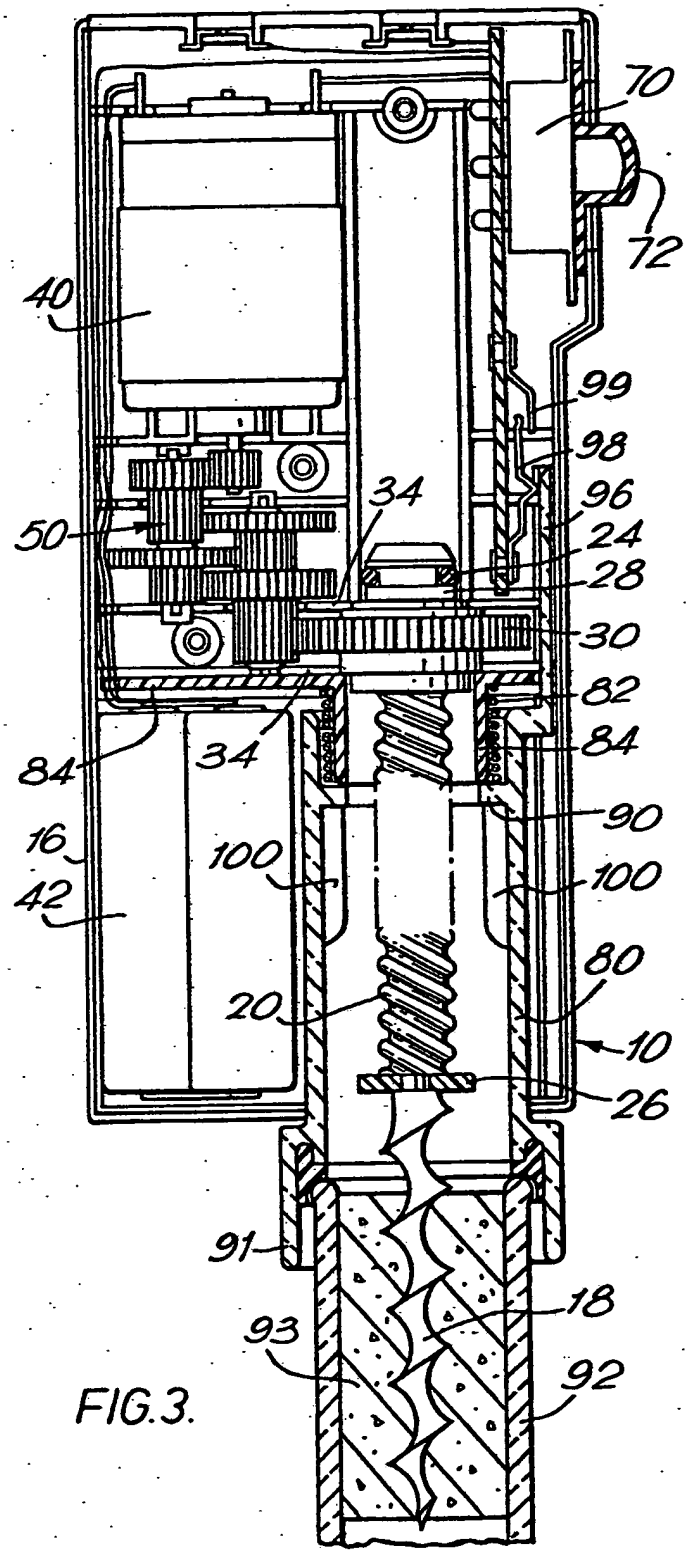

FIG.3.

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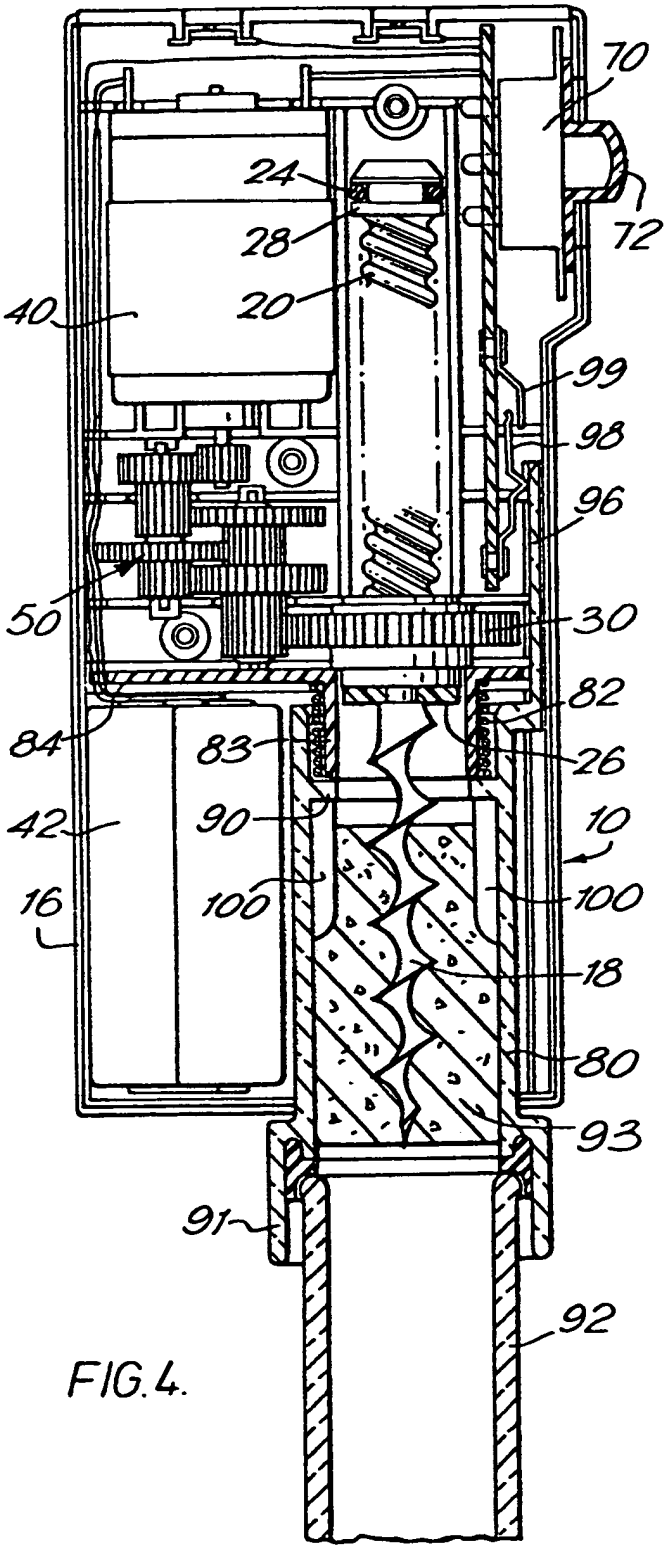

FIG. 4.

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FIG.5.

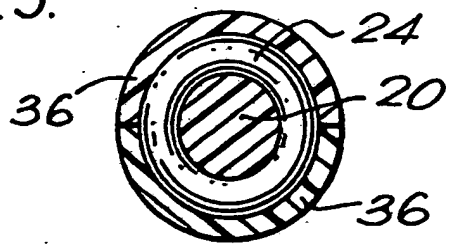
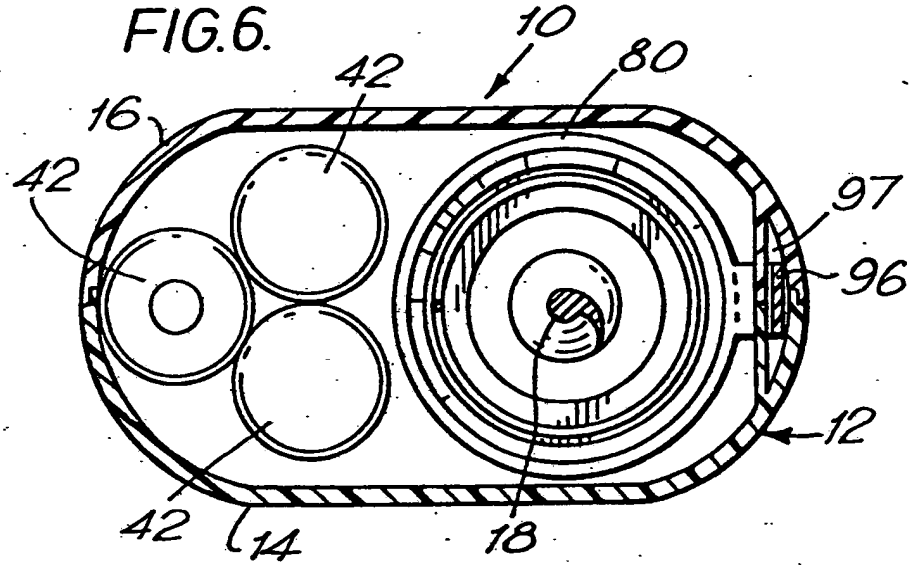


FIG.6.



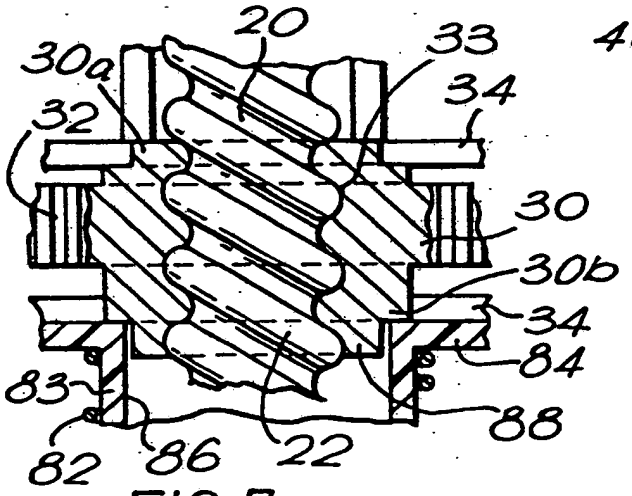


FIG. 7.

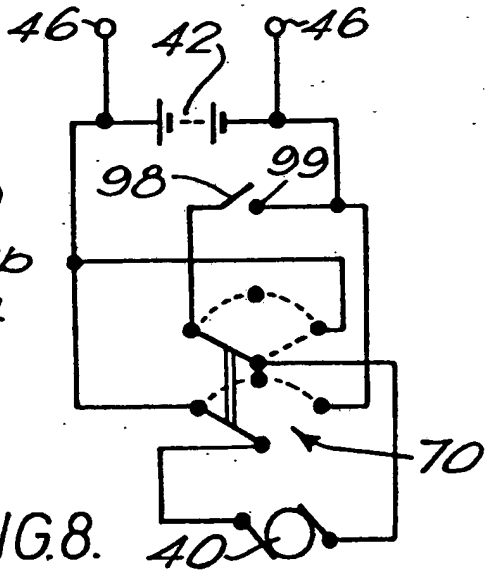


FIG.8.

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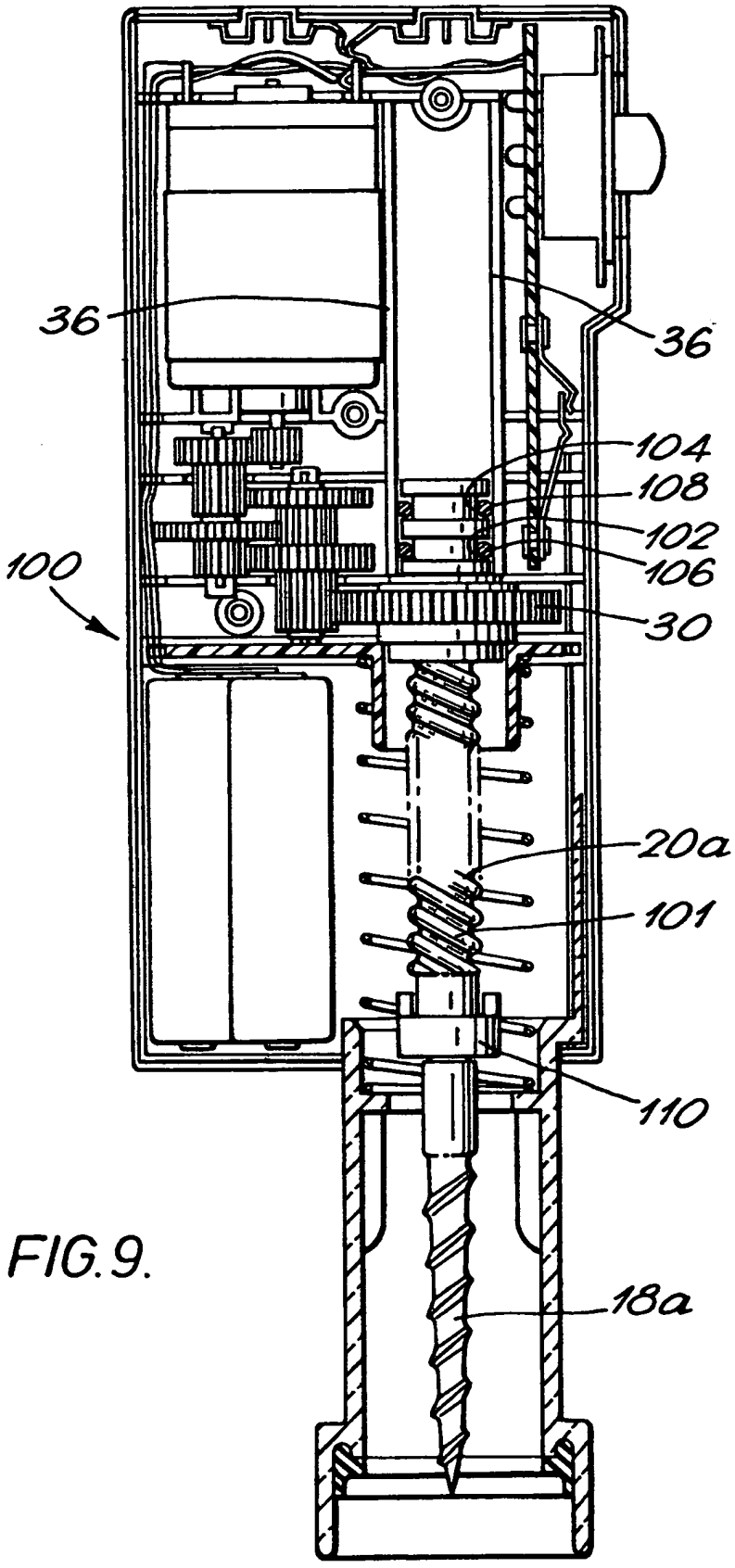

FIG.9.

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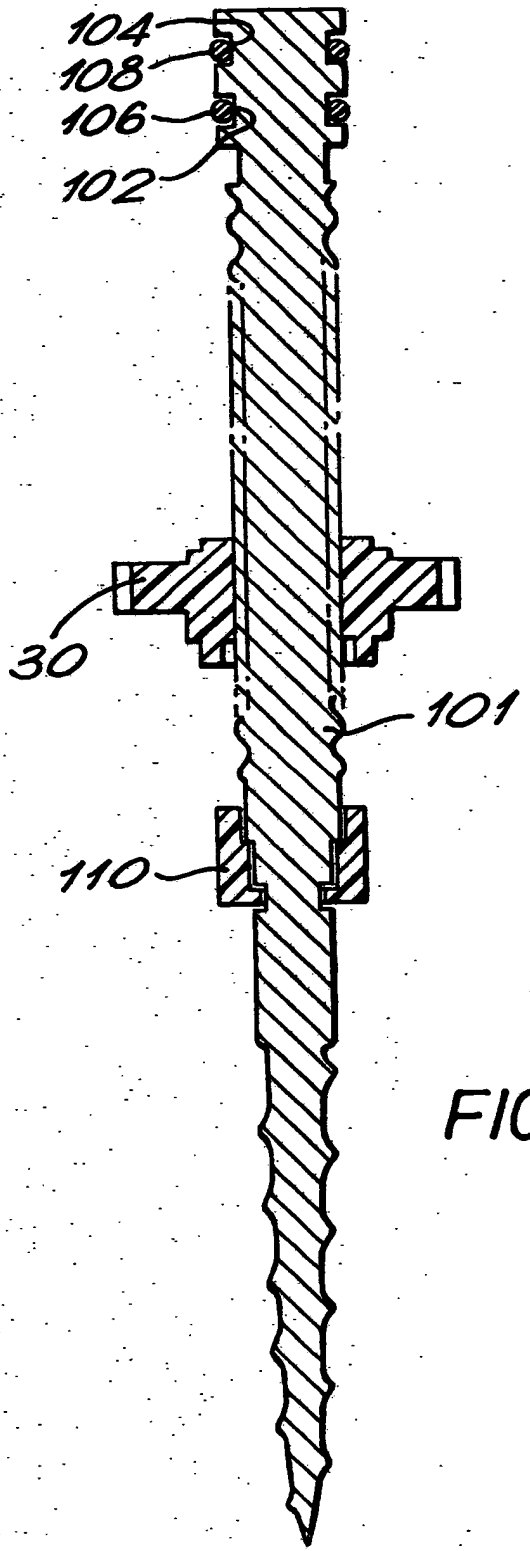

FIG.10.

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IMPROVEMENTS IN CORKSCREWS

This invention relates to corkscrews. In particular, the invention relates to an electrically operated corkscrew.

Although traditionally corkscrews have tended to be hand operated, there have in recent times been electrically driven corkscrews for removing corks from wine bottles. These tended to operate, however, in a rather simple fashion and have required a substantial amount of manual assistance. For example, one well-known form of an electric corkscrew has an arrangement whereby the screw itself is rotated to cause it to bore or drill it into the cork and when it reaches a certain point, then another drive comes into operation which causes the screw to be withdrawn. With such a device however, the user has to operate a number of controls and also removed the cork at the end of the operation.

The invention has therefore been made with these points in mind, and aims to provide a simpler and more effective electrically operated corkscrew.

An electrically operated corkscrew according to the invention comprises a body containing an electric drive motor from which is carried a screw for removing

corks, the drive being arranged in one sence of rotation to advance the screw to a point where it contacts the cork and then to rotate the screw in a sence such that the screw bores into the cork, and being arranged when rotated in the opposite sence thereafter, to cause retraction of the screw relative the body for withdrawing the cork from the bottle followed by rotation of the screw such that the cork becomes unscrewed from the screw.

With such a corkscrew, the operations are relatively simple. The user merely has to actuate the electric motor so that it drives the operating mechanism in one sence initially and then once the screw has drilled or bored its way into the cork, the user merely has to reverse the sence of rotation of the drive to cause the cork to be removed from the bottle and then to become removed from the screw. Only a single drive mechanism is therefore required and it is the direction of rotation of this which controls the different operations. Further, the user only has to control, for example, a single switch and does not need to control a separate mechanical linkage to cause the operation required.

The electric corkscrew of the invention can be relatively compact and so it is readily possible for the motor to be driven from rechargable electric storage batteries. Thus, in this way the device can be relatively compact and does not need to be connected

directly to the mains electricity and to have to a trailing flex and the like which might accidentically knock over glasses and bottles.

According to a prefered embodient of the invention, the drive from the electric motor pases through suitable reduction gearing and then rotates a pinion which is itself engaged on a thread on a plunger mechanism joined to the corkscrew itself. The plunger mechanism is also attached to friction means which provide a degree of friction against free rotation of the plunger mechanism and the attached screw. In this way, rotation of the pinion will normally cause it to work its way along the threading on the plunger mechanism and so advance or retract this depending upon the rotation of the pinion whilst the friction means will normally restrain the screw against rotation induced by the pinion. However, when the pinion reaches one or other limit of travel at either end of the thread on the plunger mechanism, it abuts a stop. Then further rotation of the pinion cannot induce further movement along the thread but instead causes the plunger mechanism and the attached screw itself to rotate and overcome the friction of the friction means.

Such an arrangement is extremely simple and has the advantage that only a single gear train is necessary between the electric motor and the pinion to provide a suitably powerful drive for the pinion.

Depending upon the direction of rotation of the motor, the pinion will work its way along the thread on the plunger mechanism attached to the screw until it reaches a stop at one end thereof and thereafter will cause the screw to rotate. As a result of this arrangement, the screw can initially be arranged to advance to contact the cork and thereafter caused to rotate to bore its way into the cork. When the direction of rotation is thereafter reversed, the corkscrew will be initially withdrawn to remove the cork from the bottle and thereafter rotated to unscrew itself from the withdrawn cork.

Preferably, the cork in its fully extended position is surrounded by a sleeve or the like which is capable of engaging the top of the bottle. Then, as the cork is withdrawn, the top surface of the cork will engage appropriate flanges on that sleeve and cause the sleeve to be retracted against the action of resilient means. The sleeve preferably has means for contacting a limits switch when it is in a fully retracted position, ie. when the corkscrew has fully penetrated the cork and that limit switch will deactivate the motor, so giving the user an indication that he should now reverse the direction of operation of the motor to withdraw the cork from the bottle.

The invention will now be described, by way of example, with reference the accompanying drawings, in which:

Figure 1 is a section through an electrically operated corkscrew according to the invention;

Figure 2 to 4 are sections similar to Figure 1 showing various stages in the operation of the corkscrew;

Figure 5 is a section taken along line 5-5 of Figure 1;

Figure 6 is a section taken along line 6-6 of Figure 1;

Figure 7 is an enlarged broken-away plan view taken in the area of the arrow 7 of Figure 1;

Figure 8 is a circuit diagram of the elctrical parts of the corkscrew;

Figure 9 is a view similar to Figure 3 of a modified corkscrew according to the invention; and Figure 10 is a sectional detail of part of the modified corkscrew shown in Figure 9.

The electrical corkscrew 10 shown in the drawings comprises an outer housing 12. This is made up of substantially identical upper and lower housing portions 14 and 16 (see Figure 6) and the resulting housing 12 encloses the operative mechanism for the corkscrew. In particular, supported within the housing is the screw 18 itself used for removing corks from wine bottles and the like.

The screw 18 is joined to one end of a rod 20. This has over threadings 22 and into one end of the rod

the screw 18 is permanently screwed in place. The rod 20 has a double start outer thread and at the end away from the screw 18 has an annular recess in which is positioned a resilient O-ring 24. At either end of the rod 20 are outwardly projecting circular flanges 26 and 28. The flange 28 is formed integrally with the rod 20 whilst the flange 26 is in the form of a washer which is secured in place by the fixing of the screw 18 into the end of the rod 20.

Engaged over the threads 22 on the rod 20 is a nylon pinion 30. This has outer peripheral teeth 32 and in addition has a central internal threading 33 as best shown in Figure 7. This threadedly engages the outside of the threaded rod 20. The pinion 30 has integral outwardly projecting circular bushes 30a and 30b and these are rotatably carried and supported by correspondingly semi-circular cut-outs in transverse flanges 34 integrally formed with the two portions 14 and 16. In this way, the pinion 30 is rotatably and securely mounted within the housing 12.

Also carried by the housing 12 are a pair of half cylindrical sleeves 36 and, as best shown in Figure 5, when the two parts of the casing 14 and 16 are brought together, these two-half sleeves abut so as to form a single hollow cylindrical sleeve. Within this sleeve, the rod 20 can slide and in addition the O-ring 24 is frictionally held. It is held quite tightly so

that under the normal circumstances, there is resistance to rotation by the rod 20, yet at the same time that rod can slide relatively freely longditudinally along the axis of the half sleeves.

A drive to rotate the pinion 30 is provided by a small electric motor 40. For convenince, this is powered by electric storage batteries 42 which are preferably of the rechargable type. Such batteries are well-known and their method of recharging is also well-known and will not therefore be described in detail. Thus, in the end of the housing are provided a pair of openings 44, behind which are electrical contacts 46. These contacts are arranged to make electrical contact with appropriate contacts on a charging device (not shown) when the corkscrew 10 is attached to that device when not in use so as to top-up the charge on the batteries and keep them fully charged.

The motor 40 has an output drive shaft 47 on which is mounted a pinion 48. This meshes with a series of gears forming a reduction gear box 48, 50 driving the pinion 30. In this way, a low speed, high torgue drive is finally imparted to the pinion 30. The gear box is composed of axles 52 and 54 which are supported in appropriate bearings on flanges 56 formed integrally with the two-half portions 14 and 16. On the axle 52 is positioned an integral pair of pinions 58 and 59. The

pinion 58 engages with the pinion 48 on the output drive shaft and in turns rotates the smaller pinion 59. This engages the larger pinion 60 of a second integral pinion pair this time mounted on the axle 54 and again the smaller pinion 61 engages the larger pinion 62 of an integral pinion pair mounted on the axle 52. Finally the smaller pinion 63 of that pair engages the larger pinion 64 of an integral pinion pair of which the pinion 66 forms part and which in turn meshes with the pinion 30. As noted as above, this provides a large degree of speed reduction and so a high torgue, relatively low speed drive is given to the pinion 30.

The direction of rotation of the pinion 30 will of course to depend upon the direction of rotation of the motor 40 and this is dependant upon the polarity of the voltage applied to that motor.

The polarity of the voltage is itself controlled by a slide switch 70. This has an outer movable lever 72 controled by the user. The switch is a three position switch. It has a central position where no power is supplied to the motor 40, one limit position where the power applied to the motor is of one polarity and an opposite limit position where the polarity of the power applied to the motor is reversed. Such switches are well-known and further description is felt to be unnecessary as is a detailed description of the actual

wiring connecting the switch 70, the motor 40 and the batteries 42.

Resiliently mounted so as to project from one end of the housing 12 is a transparent plastic cylindrical sleeve 80. This coaxially surrounds the screw 18. It is urged by means of a spring 82 in a direction outwardly of the housing 12. The inner end of the spring 82 surrounds a short cylinder 83 which is integrally formed with a divider 84 extending transversly of the housing 12. The divider has a central circular opening 86 within which an additional bush portion 88, see Figure 7, on the pinion 30 is rotatably engaged to assist in holding the pinion 30 and the divider aligned. The other end of the spring 82, bears against an inwardly directed ring flange 90 integrally formed with the sleeve 80.

At its outer end the sleeve 80 has an enlarged open end 91 for engaging over the top of a wine bottle 92 which is closed by a cork 93. At the junction between the enlarged end 91 and the remainder of the sleeve is provided an internal resilient washer 94 which is designed to engage the top of the wine bottle 92, as is best shown diagramatically in Figure 1.

At the inner end of the sleeve 80 is provided a projection 96. This projection is slidably movable within a channel 97, defined by the portions 14 and 16, see Figure 6. Adjacent the innermost end of this

channel is provided a pair of electrical switch contacts 98 and 99. As best seen in Figure 3 when the sleeve 80 is in a fully retracted position, the projection 96 reaches the innermost point of the channel 97 and bears against the switch contact 98. This causes it to deflect inwardly and breaks the contact between two contacts 98 and 99. The switch contacts 98 and 99 form part of the circuit for energizing the motor 40 in one direction and so will denergize the motor when the sleeve 80 is in a fully retracted position.

The operation of the corkscrew 10 will now be described with particular reference to Figures 1 to 4.

Initially, the screw 18 is in a retracted position where it is almost completely positioned within the housing 12. In this position, additionally, the flange 26 bears against the pinion 30. The sleeve 80 by contrast is resiliently urged to a fully extended position by the spring 82.

The user aligns the sleeve 80 with the neck of the wine bottle 92 and pushes the lever 72 in one direction so as to cause the motor 40 to be energized. In this sense, the motor is energized such that the pinion 30 is rotated in an anti-clockwise direction as viewed from the tip or end of the screw 18. Because of the friction between the O-ring 24 and the sleeves 36, the rod 22 tends not to rotate but instead the rotation of the pinion 30 tends to drive the rod downwardly and

outwardly from the housing. This continues to the limit position which is shown in Figure 2 where the flange 28 engages the pinion 30.

At this point, the pinion 30 can travel no further along the outer threading on the rod 20. Therefore, the pinion is now constrained to rotate the rod 20, now overcoming the friction between the O-ring 24 and the sleeves 36. It will be noted that at this point, the tip of the screw 18 will now be engaged with the cork 93 in the wine bottle 92 and provided the user presses the corkscrew 10 down against the cork, the rotation of the screw 18 will now cause it to bore its way into the cork.

As it does so, the engagement of the sleeve 80 with the top of the bottle 92 will cause the sleeve 80 to be pressed inwardly of the housing against the action of the spring 82. This situation continues until the projection 96 at the end of the sleeve 80 has moved to a fully inward position where it engages with the switch contact 98. It then disengages those contacts and denergizes the motor 40.

The user now knows that he has reached a point where the screw 18 has penetrated the cork 93 sufficiently. He therefore moves the lever 72 of the switch 70 to its other limit position. As, seen in Figure 8 this reverses the polarity of the power applied to the motor 40 and so reverses the direction of

rotation of the motor and correspondingly the direction of rotation of the pinion 30. Because there is a high degree of friction preventing rotation of the rod 20, namely both the engagement of the screw 18 in the cork 93 and the friction between the O-ring 24 and the sleeves 36, the pinion 30 will again work its way along the outer threading on the rod 20. Because the direction of rotation of the pinion 30 is in the opposite sense from before , the rod 20 will therefore be moved upwardly into the housing and will of course draw with it the screw 18. This will have the effect of withdrawing the cork 93 from the bottle 92 since the bottle is pressed against the washer 94 and so the cork will be progressively withdrawn from the bottle as the rod 20 is retracted.

This position is shown in Figure 4, where the rod 20 has now reached its limit position where the flange 26 engages with the pinion 30 and the cork has been withdrawn from the bottle. The user continues to allow the motor 40 to rotate and now that the rod 20 has reached its innermost limit position where the flange 26 engages with the pinion 30. Further lengthwise movement of the rod 20 is not possible and instead the friction of the O-ring 24 in the sleeve will be overcome and the rod 20 will be rotated as will the screw 18. The sense of rotation, however is now in the opposite sense and so the screw will now work its way out of the cork.

The cork is initially held against rotation by integral inward flanges 100 on the sleeve 80, and then the user should hold the cork against rotation, and it will eventually become free in his hands.

After this, the sleeve 80 can resiliently move to it's outer postion under the effect of the spring 82 and it will be appreciated that the inititial position of the parts as shown in Figure 1 has now been restored ready for further operation in removing a cork. The user merely has to move the lever 72 to its off postion and he can replace the corkscrew 10 in an appropriate holder or the like, so that the contacts 46 supply power to recharge the batteries 42.

As will be appreciated the operation of the corkscrew 10 is simple yet very effective in removing the cork 93 and releasing from the screw 18 at the end of the operation of opening the bottle 92.

Figure 9 shows a modified corkscrew 100 according to the invention. A one piece screw and rod member 101 is formed in one piece as a synthetic plastic moulding. The. The rod portion 20a has an outer thread just as the rod 20. In addition at the end away from the integral screw 18a it has two annular recesses 102 and 104 in which are positioned resilient O-rings 106 and 108. These functions just like the O-ring 24 and these are capable of sliding in the two half cylindrical sleeves 36.

A circular flange 110 (see Figure 10) made of glass reinforced nylon is rigidly secured to the one piece screwed rod member 101 in place of the flange 26 shown in Figure 1. This flange 110 functions in an exactly analogous way to the flange 26.

In all other respects the modified corkscrew 100 is constructed like and operates like the corkscrew 10 and no further description is believed necessary.

CLAIMS:

1. An electrically operated corkscrew comprising a body containing an electric motor drive and the body carrying a screw for removing corks, the drive being arranged in one sense of rotation to advance the screw to a point where it contacts the cork and then to rotate the screw in a sense such that the screw bores into the cork, and being arranged when rotated in the opposite sense thereafter, to cause retraction of the screw relative the body for withdrawing the cork from the bottle followed by rotation of the screw such that the cork becomes unscrewed from the screw.

2. A corkscrew as claimed in Claim 1 in which the activation of the electric motor is controlled by a single polarity reversing switch.

3. A corkscrew as claimed in Claim 1 or Claim 2 in which the electric motor is driven from rechargeable electric storage batteries is contained in the body.

4. A corkscrew as claimed in any preceding claim in which the drive from the electric motor passes through reduction gearing and then rotates a pinion rotatably supported on the body and which is itself engaged on a threading on a plunger mechanism joined to the corkscrew itself.

5. A corkscrew as claimed in Claim 4 in which the plunger mechanism and corkscrew are an integrally formed member.

6. A corkscrew as claimed in any of Claims 4 to 6 further comprising friction means which provide a degree of friction against free rotation of the plunger mechanism and the attached screw and, at either limit of axial movement of the plunger mechanism, stop means are provided to prevent further axial movement.

7. A corkscrew as claimed in Claim 6 further in which the stop means comprise a flange at the junction of the said threading and screw, the pinion engaging the said flange at the limit of the threading and thereafter further rotation of the pinion in a direction tending to cause the pinion to move along the threading towards the flange causing rotation of the screw.

8. A corkscrew as claimed in Claim 7 in which the friction means comprise at least one resilient O-ring surrounding the plunger mechanism and slidably born within a cylindrical sleeve, to prevent rotation of the plunger mechanism relative the sleeve whilst allowing longitudinal sliding of the plunger mechanism relative the sleeve.

9. A corkscrew as claimed in any preceding claim further comprising a sleeve slidably supported by the body which surrounds the screw in its fully extended position and which is capable of engaging the top of the bottle.

10. A corkscrew as claimed in Claim 9 in which the sleeve has an inwardly extending flange which is engaged by the top of a bottle as the screw bores into the cork so that the sleeve is retracted into the body against the action of resilient means by that engagement.

11. A corkscrew as claimed in Claim 10 further comprising a limit switch contacted by the sleeve when it is in a fully retracted position, i.e. when the corkscrew has fully penetrated the cork, that limit switch then deactivating the motor, so giving the user an indication that he should now reverse the direction of operation of the motor to withdraw the cork from the bottle.

12. An electrically operated corkscrew substantially as herein described with reference to Figures 1 to 8, or Figures 9 and 10, of the accompanying drawings.

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